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AN ILLUSTRATED MONTHLY
DEVOTED TO PHOTOGRAPHY IN ITS WIDEST SENSE

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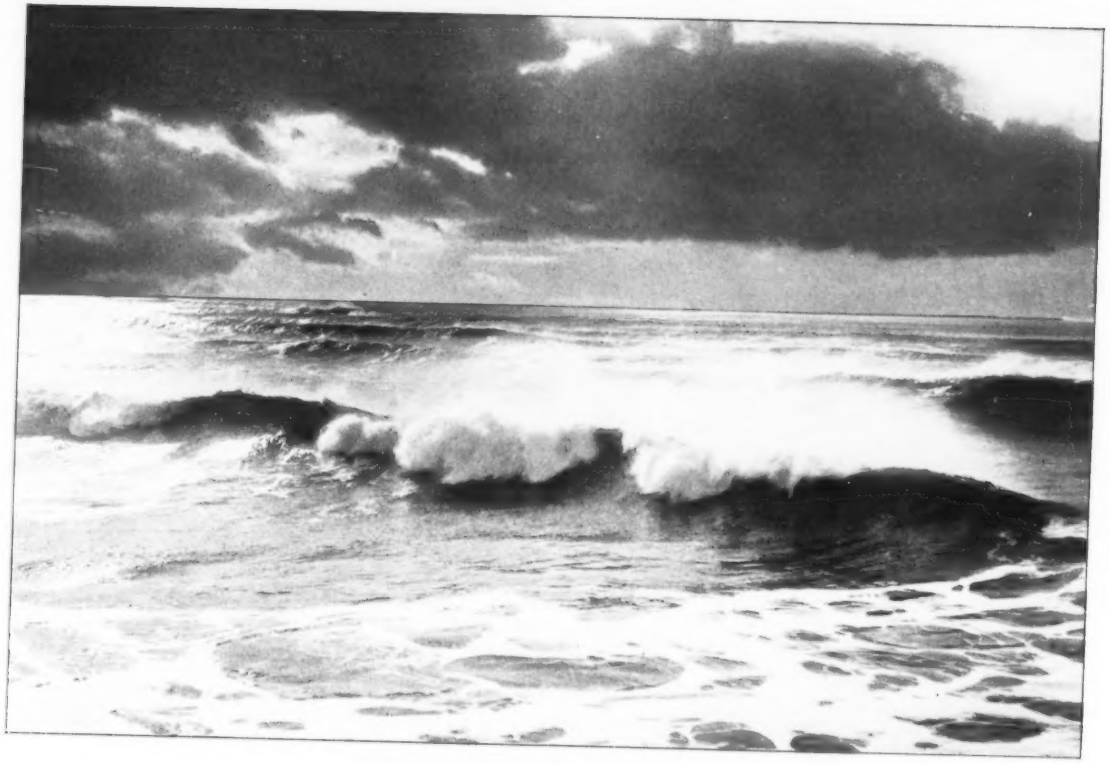


"WHERE THE SEA WAVES BREAK."
A SCENE ON THE NEW JERSEY COAST.

NEGATIVE BY A. H. PHILLIPS, ATLANTIC CITY, N. J.

AMERICAN JOURNAL
OF
PHOTOGRAPHY

THOS. H. McCOLLIN, Managing Editor.

JULIUS F. SACHSE, Editor.

VOL. XVI. AUGUST, 1895. No. 188.

STARCH AS A MOUNTANT.

AT a meeting held on 10th inst. by the Croydon Microscopical and Natural History Club (photographic section) the subject was a "Discussion on the Use of Starch as a Mountant," opened by J. H. Baldock, F.C.S. In discussing the subject, it may be as well just to refer very briefly to what starch is, and its behaviour under various conditions. With the exception of some of the alga and lichens, starch occurs in almost all plants, generally in the form of colorless, transparent granules, varying considerably in size, and in less degree in shape. The appearance of these granules under the microscope is characteristic, for there is seen a central spot called the kilum, which is surrounded with concentric rings. If the polariscope be now called into use, most of the grains will show a black cross having the kilum for its centre. But although so very widely distributed in nature, the varieties in commerce, and therefore those likely to be used by the photographer, are much more limited, thus in buying starch for mounting purposes he is likely to be supplied with either that obtained from various species of canna (tous-les-mois), or maranta arundinacea (arrow-root), or solanum tuberosum (potato), or triticum vulgare (wheat), or lœa mays (maize), or oriza sativa (rice). The microscopical appearance (plain and polarised) of all these, together with authentic samples prepared by myself from the above plants, together with starches from peas, beans,

chestnuts, orrisroot, etc., also prepared by me, I now show you. When starch is used as a mountant, it is of course necessary to bring it into a state of disintegration, ***not solution***, because starch paste as made is not a true solution. The usual plan adopted is to make the starch grains into a cream with cold water, and then pour on, with constant stirring, boiling water till it thickens, about twenty parts of water to one part of starch being the proportion. If, however, the starch paste be subsequently boiled for a few minutes, more complete disintegration takes place, a clearer jelly is obtained, and better keeping properties secured. It is important not to have the starch too thick, otherwise it has a tendency to be lumpy when spread over the print. Professor Bothamly states that rice starch is to be preferred, but after using all the kinds mentioned above, I am disposed to think that there is but little, if anything, to choose between them. There is one peculiar property of starch, which, though largely taken advantage of in the arts and manufacturers, does not, for some reason or the other, seem to commend itself to photographers. The property to which I allude is that of its conversion at a temperature of about 160 deg. C. (230 F) into dextrin or British gum, in which state it is perfectly soluble in water. A viscid solution of this I have had by me for years, and it is perfectly good and usable now. The same change is effected by the action of various dilute acids, aided by heat, but the presence of these, though unobjectionable to the calico printer, etc., would hardly be esteemed by the photographer. With regard to the keeping properties of starch, which may interest those who do not care to go to the trouble of making it fresh every time, an objection I quite fail to appreciate, I may say, boil it well to start with, and then add a *small quantity* of some aseptic substance, such as boric acid, salicylic acid, oil of cloves, etc., and it will keep thus in a corked, wide-mouthed bottle for weeks or months. Alum has been suggested, but although it undoubtedly preserves the paste, its use cannot be recommended for photographic mounting. An objection has been raised against the use of starch as a mountant, on the ground that it contains gluten, which would be likely to cause an acid fermentation, but in none of the samples on the table to-

night, numbering sixteen, and obtained from chemists, grocers, oil shops, and wholesale druggists, does this substance exist, neither could it unless it originally existed in the plants from which the starch was obtained, and was intimately associated with it, taking wheat as an example. Mr. H. D. Gower said a question was asked in *Photography* for December 13th, 1894:—"Is the starch of commerce likely to be pure, seeing that it is not made for photographers, but for laundresses?" The question of purity in starch, as used by photographers, for the purpose of mounting prints, is one that ought to be seriously studied. At the present time, when such keen competition exists in producing a commodity used, I might say, almost in all households, it stands to reason rapid methods of production, and, at the same time, economical ones, are bound to stand prominently in front of the old-fashioned methods. Considering that about seventy-five per cent. of starch exists in wheat, it seems curious that photographers cannot prepare the mountant themselves of such a purity as to be independent of the manufacturer. The process of manufacturing starch is not one of the cleanest (as made on a large scale), but through its whole process there seems to be little chance of impurities existing as regards laundry work, but many things have to be taken into consideration when used as a mountant for photographs. It is a question if the gluten which exists in the manufacture has been entirely taken out. To do this properly the utmost care has to be exercised in the operation; the acetous fermentation that goes on between the gluten and starch, and which has the effect of *eventually getting rid of the gluten*, may not be properly effected. The separation of gluten from starch is also brought about by adding caustic soda or potash. Starch is an excellent all-round mountant in its way, and it certainly is an open question at the present time whether it is the starch at fault or some impurity, such as gluten, that makes its presence felt at some time or other, for if the gluten has not been entirely taken out of the starch that has been used, and moisture is at any time, and in any way, imparted to the mounted print, slow fermentation is most likely to take place at the expense of the starch; nor is this the only evil, as by the de-

composition of the gluten, we again get ammonia and acetic acid, which unite and form acetate of ammonia, the starch in its turn fermenting and forming lactic acid; therefore it is a question whether some preservative should not always be used in conjunction with starch paste. Starch may be made from the ordinary commercial variety or arrowroot, and any one who uses this mountant has an easily-made and very clean medium, cheap and economical, but after keeping a few days it begins to go wrong. The cooler starch paste is kept when made, the longer will sourness and fermentation be resisted, but put into a warm place, then fermentation at once sets up. Numbers of preservatives have been given from time tome, some good some bad. Salicylic acid is recommended by some, and it certainly does keep it good for a time, but after a week it begins to change, the acid really acting as a disinfectant. Alum is also recommended, but if used in sufficient quantity to place the starch beyond corruption, the paste is hardly fit to use for photographic purposes. A small sample which I place before you was made up on December 17th, 1891, and is nearly the last of a quantity I made up, and which I have used from time to time since. It was made as follows (I will give you small quantities, so any member can try it for himself): One ounce of best white starch may be taken, put into a basin, and add enough water to cause disintegration; afterwards it should be made up to about half a pint of water, or less if a stiffish paste is required. It is then put into an enamelled saucepan or glass beaker, and put on the fire. A Bunsen burner or gas stove is to be preferred, as the process of thickening can be much better watched, and the flame regulated underneath. When the solution begins to turn, which can be seen from the transparent effect that it undergoes, it is at the same time constantly stirred; after it has turned and thickened, the heat may be continued for some minutes longer, and then the vessel removed from the flame. While quite hot, add half an ounce of pure glycerine, and well stir it in; after having cooled a bit it may then be turned out into a wide-mouthed bottle, and two or three drops of oil of cloves, or other essential oil to suit one's "smell," added, though this is not necessary, and, finally,

when nearly cold, about half an ounce of methylated spirit, and well shaken up together. Pure glycerine should be used, of a fairly high specific gravity; some samples not being entirely free from impurities. Price's patent glycerine is quite fit for the purpose, and should be perfectly colorless. Some makes have a curious taste, but this is not fit, and such samples should be discarded. Adding the spirit equalizes the hygroscopic properties of the glycerine, at the same time holding any essential oil in a more soluble condition; as the starch is used the spirit will evaporate from it, when a little should be added from time to time, but not too much to make the paste too thin. Arrowroot and flour from different grain can be similarly treated, each containing more or less gluten. Mr. Baldock said that all starch was not made for laundresses, as large quantities were employed for toilet and nursery purposes, and it was worthy of notice that all the samples obtained from chemical sources were either wheat or maize, whereas the oil shop and grocers' starches were, almost without exception, rice. It was very easy to make starch on a small scale, without any fermentation, by using caustic soda, somewhat weaker than that of the Pharmacopœia. Messrs. Grundy (chairman), Rood, Harrow, and others took part in the discussion, the conclusion being that pure starch freshly made, with a little preventive added, left nothing to be desired in the way of a mountant.

Bear all troubles patiently.

Do not reckon upon chance.

Make no useless acquaintances.

All men are dust—some gold-dust.

A good advertisement is good advice.

The wise man sees when the fool but looks.

The brighter the light the darker the shadow.

Truth is the highest thing a man may keep.—*Chaucer.*

Be not simply good, but good for something.—*Thoreau.*

Cultivation is as necessary to the mind as the body.—*Cicero.*

THE BICHROMATE INFECTION.

THE so-called Bichromate disease (*chromkrankheit*) has of late attracted serious attention in some parts of Germany, on account of its frequent occurrence among the workmen engaged in photo-lithographic and Lichtdruck establishmeuts. This malady is not altogether a new one, as it dates from the time when the chromate processes were discovered.

Strange to say, thus far no specific remedy has been found that will actively counteract the poison and prevent infection.

The malady up to the present time has baffled the most skilful physicians of all schools. It is true that various remedies have been suggested, and which it is claimed will ameliorate the malady, but none have been brought forward that will eradicate the poison from the human body.

It is one of the characteristics of the bichromate infection that it courses through the body in the same manner as a swallowed needle, seeking to find some convenient outlet, but woe to the patient if in its course the virus meets with a disorder of a scrofulous nature.

Dr. John H. Janeway, U. S. A., describes this malady* as "A troublesome and ofttimes serious disease, affecting all parts of the body exposed to contact with bichromate of potash, either in the solid or liquid form. With the latter form contact with an abraded surface is followed by tingling or smarting, heat or soreness at some small spot on the finger or hand. Continued exposure by dipping the hand in a solution or handling the dry salt, increases the effect and excoriation. Obstinate in their character appear these constitutional symptoms—eczema or psoriases on the hands, in the flexures of the joints, and in different parts of the body. Ofttimes boils, hard and painful and obstinately slow, make their appearance. Frequent crops of these appear without any apparent cause. The fine dust arising from the friction of the crystals, inhaled by the nose or mouth, even in very minute quantities, often gives rise to a distressing and obstinate catarrh,

* *American Amateur Photographer*, Vol. 3, page 38.

and workmen in factories where the bichromate is manufactured have been known to loose the septum of the nose. The obstinacy of the disease is characteristic, and the person's life is rendered miserable for a long time by its persistency and liability to return. The greatest care is therefore necessary in handling this salt whether in its dry state or in solution. In sensitizing one should always use India rubber gloves, and above all, it is necessary to avoid all excesses in living. During development expose the hands as little as possible to the bichromate, especially in winter when the hands are liable to be chapped, for the poisonous action of the salt is rapid and disastrous."

M. Beaumois, an operator of more than usual experience, recommends the daily use of the following mixture, which he employs with success upon his own hands:

Glycerine - - - - -	½ ounce.
Carbolic acid, C. P. - - -	10 drops.
Water - - - - -	2½ ounces.

Another suggestion made is to mix this solution with a boraeic salve (*Borsalbe**), with which the whole body is to be anointed before retiring for the night. The body is to be thoroughly rubbed with this ointment, which is then allowed to dry. Naturally this must be done in a warm room to prevent taking cold.

But where the disorder is once seated, even this remedy is of no avail. During the course of infection the condition of the blood is of great moment. A person liable to the bichromatic poison will frequently have a confirmed case of the disorder in less than a week from working with bichromate solutions, especially if such are used in connection with gummy substances, or where the solutions are of a high percentage.

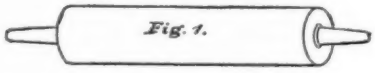
The photo-mechanical branches of photography are especially conducive to the spread of this strange malady. First upon the list is the sensitizing of paper for the various photo-lithographic processes, which require the use of a fine per cent. solution. Less dangerous is the sensitizing of pigment tissues which require but a 2 to 3 per cent. solution. The same is the case with the ordinary half-tone processes on zinc and copper.

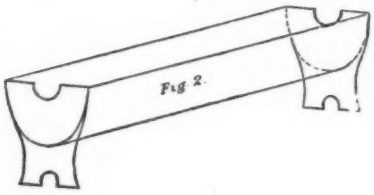
* *Photographische Chronik*, Vol. 2, page 186.

The preparation of the second tissue for the Lichtdruck process involves a greater risk. The most dangerous, however, is the so-called American Enamel, or fish-glue process, for photomechanical work, as this method not only calls for a high percentage of the bichromate salts (14 oz. to 200 cc.m. of solution), but to make matters worse the sticky substance with which the poison is combined makes it a source of constant danger to the operator, as the mass is apt to adhere to the skin, when the poison is quickly absorbed into the system.

There is one preventative, which from its simplicity and cheapness, is neglected by the majority of operators; this is nothing else than cleanliness, and it may be said that only in rare instances will a careful operator become infected if he practices scrupulous cleanliness. Yet cases are on record where all precautions have failed.

Fortunately a malady of this kind is easier to prevent than to eradicate. For the purpose of overcoming all danger of infection in the preparation of bichromatized papers, Herr C. Fleck, an ingenious German, has lately constructed a simple and prac-





tical contrivance*. This consists of a trough of Japaned tin, figure 2, and a wooden roller, No. 1. This apparatus can be used for silvering as well as bichromatizing; all that is requisite is to pour a sufficient quantity of the solution into the trough, and the paper or tissue is fastened on the roller with thumb tacks.

* *Photographischer Almanack*, 1895, page 56.

After the paper is dusted, the roller is placed into the grooves at the end, and is slowly turned; the roller is then taken out, and held by the end over the trough to drain the surplus solution, after which it is placed in the dark-room, and left to dry upon the roller. As many rollers are necessary as sheets of tissue are to be sensitized at one time.

The advantages of this simple apparatus are as follows:

1. Ease in dusting, and an even coating of the paper or tissue.
2. No staining of the hands with silver or bichromate.
3. It obviates all danger of bichromate infection.
4. There will be no more complaint about blisters or uneven sensitizing.

J. F. Sachse.

VARIOUS METHODS OF IMPROVING NEGATIVES AND PRINTS.

By Edward Dunmore.

THE treatment of negatives and prints in order to effect some improvement, real or fancied, on the purely photographic image, has been a source of contention and quibbling ever since photography became a popular occupation or amusement. That negatives especially lend themselves to the skilful manipulations of the improver, few will dispute, and that they may be considerably advantaged by the treatment is also patent, as well as spoiled, witness the elaborately retouched monstrosities that pass for portraits at the present day, more's the pity of it. However, the abuse of retouching is not by any means condemnatory of the process itself, which in the hands of anartist is a really valuable, I might add an indispensable aid to truthfulness.

In the following article I propose to treat of hand work in its various forms, hand work from my point of view being *any* addition, alteration, or modification of the image produced solely by the action of light through the lens on the sensitive surface, or on the positive made from it. The wide divergence of opinions as to the legitimacy of doing *anything* to a negative in certain

directions other than stopping out actual blemishes should, I think, without better knowledge of the process and advanced art training, be non-existent.

Perfection having been attained long since in the production of the chemical image—in the use of our tools—we can hardly expect any further improvement in this direction. What is left us is the modification of this image by hand work so that its shortcomings are lessened, and its artistic and picturesque qualities augmented. There are, of course, certain cases which forbid *any* alteration, even the slightest, of the light-formed image produced by the lens. Legal and other documents are in this category; in such instances hand work is entirely out of the question, and to such these remarks will not apply. Hand work may be classed under the following heads, all being intended to improve the purely photographic image; namely local reduction and intensification, pencil and brush work, papering, scraping and cutting out, clouding, masking and tinting, combining several images in one print, stopping out with opaque color, and the application of varnishes colored and uncolored. In this comprehensive list much is approved and adopted by all photographers, but is not *termed* hand work, although it undoubtedly is. Brush and pencil alterations are selected for this distinction almost exclusively; why, it is difficult to say, unless it is a survival of a tradition of early days before the capabilities of the process were so well understood, when by a few well-placed touches the artist photographer could so improve his picture that his less artistic brother was placed at a disadvantage in competitive exhibitions, or, it might be, too much was expected of photography, *per se*, in an artistic sense, at any rate there is now a widely disseminated feeling that the *improvement* of the photograph by any means is legitimate. This does not mean that any less skill is required in the first stages of the pictorial inception, for the best work always will be the best, but that it may be afterwards modified in various manners to enhance its pictorial qualities.

There are very few negatives and prints that cannot be improved by hand work of some sort, as indicated by the foregoing catalogue; at the same time, whatever it is, it should not

be aggressive or pronounced in character. *Ars celare artem.* With regard to its application, more especially to negatives, it is advisable to make a rough print in strong diffused light, good as it can be made, without partial shading or any other special precautions, before anything is done with the idea of modifying or improving it; we shall then see exactly the line of treatment necessary to be adopted. The first alterations come under the head of chemical, being local intensification and reduction, or mechanical, or rubbing down, or scraping out. The method generally adopted for local chemical reduction is the application of a solution of perchloride of iron mixed with a little gum mucilage to prevent spreading, and applied with a brush, afterwards dissolving the chloride formed with hyposulphite of soda solution, or dissolving the image with ferricyanide of potassium and hyposulphite of soda mixed in solution, also with the addition of gum, care being exercised not to carry the reduction too far. Chemical intensification cannot be so well performed on *sharply defined spaces*, although there is little difficulty when larger areas are to be dealt with, such as the bed or foreground of a negative.

Mechanical reduction by friction of a pad moistened with spirits of wine is a most useful device, and available during the unvarnished state of the negative. This should be done using as little force as possible, and with *strong* spirit; a weak spirit softens the gelatine and gives rise to trouble. The negative also must be thoroughly dry to begin with. Scraping may also be resorted to in certain cases, when the appearence of a coarse texture is desirable, as, for instance, a rough log of wood or, post and rails that reflect too much light, may by this means be brought into better harmony. Specks of light occurring in masses of shadow can be picked out with a knife point. In seascape the separation of the sea and sky is effected by ruling a pencil lime, faint or strong according to the density of the negative, and softening off the line into the sky with a little black lead rubbed on. Thin places can be improved by rubbing them over with a little black lead on the tip of the finger. In fact, any improvement to be made with the lead pencil is more easily done before varnishing than after. With regard to varnishing, I think all negatives that

are worth keeping are worth varnishing, although there are many who have an insuperable objection to protect their negatives by this means. On gelatine films varnish makes *no* perceptible alteration in the printing detail, as it used to do occasionally on wet collodion, especially after intensification. It was, of course, *absolutely necessary* to varnish the collodion film before it could be printed from, even with the knowledge that the negative might be somewhat impaired by the process. Varnishing also, under certain circumstances, improved the wet plate negative, giving more transparency to lights that would otherwise be too dense. Gelatine is not, however, affected in any way, other than being rendered less liable to injury; if any store is set by the negative, it is well to do it. It is particularly needful if the negative is sent to the professional printer. Many copies being wanted, it stands to reason, where many negatives have to be printed and attended to, the same care cannot be bestowed upon them as when only a copy or two is worked off at home, nor would it be reasonable to expect it. This applies particularly when albumenized paper prints are required and the printing is conducted in the open air in damp weather. In a very short time the unvarnished negative will become spotty, and eventually quite spoiled, in spite of any care that may be exercised in the printing. In case of *many* copies being wanted it is advisable to give the negative a coat of plain collodion before the varnish, which will make the film quite safe with ordinary careful treatment.

The negative having been varnished, we may proceed to further modifications and improvements. In the first place, stop out pinholes, those small defects familiar to photographers. More skill is required to do this well than appears at first sight. In a general way, early attemps are anything but successful, the familiar appearance on the print of a large white spot with a black center being a frequent result. It requires a certain knack to place a small modicum of color in the center of each pinhole without smearing it on the surrounding film. The inexperienced generally use too much color, and then too thin. A very little, dry as it can be worked, should be taken up on the point of a fine sable brush, and the center of the spot delicately touched.

Pinholes appear much larger than they really are, by reason of irradiation. The stronger the light by which they are examined the larger they appear. Begin by stopping out the larger ones; the smaller then become conspicuous, and may be attended to in due course. The *very* small ones will not show on the print, and are better left untouched, as are any that occur in the darker or shadowed parts of the picture. Larger holes or accidental tears must be matched up to the surrounding parts, following the design of the picture in form and texture. A large gap is all the better for a piece of *papier mineral* gummed on the back of the negative over the fault before beginning to work it up, as this tends to harmonize the *printing* effect with that of the gelatine film.

Some parts of a negative, although perfect in technique, may print rather too deeply in comparison with other parts, or the requirements of the picture. We equalize it by gumming *papier mineral* smoothly over the back of the negative, and when dry, cutting through the papers with a sharp-pointed knife, and those portions requiring added strength, and an eight of an inch or so outside of them to permit of a rough serrated edge being given in order to prevent any line showing during printing. With architectural subjects, advantage should be taken of any dark lines which can be followed, in cutting straight ones by the aid of a flat rule. The cutting being finished, a little moisture is applied with a sponge over the portions to be removed. In a minute or two they will be found to strip off quite easily. This is the advantage of using gum as a cement. When *dry* the edges can be serrated when desirable, and small bits of paper picked off over dense spots, or increased density may be given with a lead pencil.

At this stage clouds can be added, first, by drawing on the back of the negative those of a suitable pattern. If the negative happens to be *very dense*, clouds need be merely *outlined* in black varnish on the bare glass, this showing sufficiently strong to break up an even tint; more cannot be expected with such a rough-and-ready method—it is an improvement, and that is all that can be said for it. Clouds added from separate negatives is by far the best plan. It frequently happens that clouds showing on the negative are not more than faintly indicated on the print.

If the density of this portion of the negative is reduced, the probability is that the clouds will print, but print flat and poor; therefore, unless the developement has been so managed that they have the proper relative intensity, it is better to neglect them, and print in from another negative. It rarely happens with an *ordinary* landscape that the clouds cannot be much improved upon by selection than contenting oneself with the original pattern as it appeared when the landscape was taken.

With moonlight views it is the general custom to attach a circular opaque disc or portion of one—to represent the moon—but on a much larger scale than the real moon appears, or ought to appear, the result is a round white patch no more like the moon than a plate, and does not convey the idea of solidity, distance or space. We have become so accustomed to see the moon painted on this gigantic scale that we *fancy* it all right. The same principle has been applied to distant mountains, but we are gradually realizing the mistake. A moon on the correct scale will give expanse to the cloud-scape, and although it occupies such a small space, it is worth while to copy a suitable photograph and insert it, either by printing in or transparency of film, the fact of giving solidity and rotundity to the moon more than making up for its diminished size, adding much to the realistic appearance *especially* if shown as a lantern slide.

In architectural subjects, ornamental work, relieving against the sky, frequently merges into it and becomes lost; in such cases it is advisable to stop out the sky entirely with opaque color, *accurately* following the outline of such objects; where large spaces have to be treated a favorite method is to paint a broad line round the object and fill up the space with opaque paper attached to the back of the negative; waste sensitized paper answers admirably, it can be roughly printed as a guide, cut out, and allowed to darken—a good opaque *water color* will be found best for lining round, and black varnish for filling up smaller spaces; the reason black varnish is not used entirely for this purpose is because of its disposition to spread, unless of exactly the right consistency, so encroaching on the work and obliterating it; but, independently of this, the difficulty of working an intri-

cate edge with it is much greater than with water color, to which it has almost universally given place for this particular purpose.

Colored varnishes made by the addition of a little aniline dye to spirit varnish and applied to the back of the negative are often very useful, scraping it off over those parts that are already sufficiently dense. Ground-glass varnish used in the same way is good for slight alterations in intensity.

The powder process has been highly spoken of as a method of improving negatives, but is rarely used in this process. The back of the negative is covered with a coating of bichromated gum, or dextrine, exposed to the light, and dusted over with finely powdered plumbago, which adheres to those parts unacted on by the light in proportion to the gradations of the negative; the difficulty is in so regulating the hygroscopic nature of the film that the powder development shall be smooth and even; a little glycerine is added proportionate to the humidity of the atmosphere in which the process is carried on. A successful worker states that he allows a drop of glycerine for each degree of moisture beyond a certain normal standard. If this process is used, it is requisite to protect the back of the negative carefully from abrasion during printing.

A very thin over-exposed negative can be made to give much improved results by making a very thin duplicate negative, and printing them in close contact, seeing of course that they are accurately registered. No matter what means of improvement are adopted, it is essential that care and skill be exercised, combined with artistic knowledge, or in all probability the last state of the negative will be worse than the first.—*British Journal of Photography.*

An old admiral, well known for his power of exaggeration, was describing a voyage at supper one night. "While cruising in the Pacific," he said, "we passed an island which was positively red with lobsters." "But," said one of the guests, smiling incredulously, "lobsters are not red until boiled." "Of course not," replied the undaunted admiral; "but this was a volcanic island with boiling springs!"—*Pearson's Weekly.*

TEMPERATURE AND EXPOSURE.

THE paper read by Captain Abney at the Camera Club Conference on this subject opens up a question of great importance to photographers generally. The practical results of his experiments, up to the present, may be summed up as follows: Plates vary in their sensitiveness directly according to the temperature, that is to say, the sensitiveness of a plate increases with a rise in the temperature and decreases as the thermometer falls. The variation is greater in the case of slow plates than with rapid ones, and the author of the paper stated that a very rapid gelatine plate required at a temperature of 0° F about one and a half times, while a slow gelatine lantern plate required about two and a quarter times the exposure necessary at 100° F.

In ordinary every day work we are not likely to often meet with variatious of 100° in the temperature, for the difference between a hot summer's day and an ordinary cold winter's day, as a rule, is not much over 55° or 60°; still this is enough to add about half as much again to the necessary exposure for a slow plate; and in excessively cold weather such as we had a short time ago, the variation will be greater. Although we have always known that longer exposures were necessary in winter than in summer, yet we only considered this to be due to the variation in the actinicity of the light, and disregarded the question of temperature; we now learn that this factor must be considered as well.

If we consider the light in July to be four times as actinically powerful as in December, it naturally follows that in the latter month we should give any particular subject at least four times the exposure that we should give in July. We may have a warm winter's day of about the same temperature as a cool summer's day, and in that case the proportion of 4 to 1 would be correct, but consider what happens in the following case. On a very hot summer's day, with the temperature at 85°, a certain subject requires, in sunshine, on a very slow plate—not, of course, a lantern plate—say 1 sec. exposure; in the depth of winter, in sun-

1842.

THE FIRST SUCCESSFUL FULL-LENGTH CHILD STUDY.

DAYUERROTYPE BY W. & F. LANGENHEIM,
PHILADELPHIA, JUNE, 1842.

shine, but with the thermometer at 10° F—not an unusual temperature in the last winter—on the same subject we should have to allow four times the exposure for the difference in the light, and in addition about three-quarters as much again for the difference of 75° of temperature. This would make an exposure of seven seconds instead of four. Again, suppose the winter view is not taken in sunshine, but in what the tables call "dull light," this makes it necsssary—according to Wheeler's tables—to treble the exposure, or give twelve seconds on account of the light only, or twenty-one seconds altogether in consideration of the difference in both light and temperature. The extra amount of exposure to be allowed on account of temperature is now becoming serious, and the longer the initial exposure has to be, on the account of the light only, so much the more serious becomes the question of whether the exposure is to be increased on the ground of low temperature or not. Those who rely solely upon exposure tables, we believe, generally come to grief over exposures made in the depth of winter; we imagine these tables are calculated simply upon measurements of the actual actinic value of the light at different seasons of the year; if so, it stands to reason that great differences in the temperature will render the information given by them comparatively valueless for long exposures on slow plates, unless we know what proportionate variation to allow. It is certainly a relief to hear that the sensitiveness of fast plates is not so much affected by heat and cold, but at the same time this renders the question of what allowance to make still more complicated; for the factor must vary not only with the temperature but with the speed of the plate.

The most practical way in which to make use of the information which Captain Abney has added to the great store for which we are already indebted to him, is, perhaps, to give about double the tabulated exposures in intensely cold weather, when we use slow plates, or reduce the time slightly in very hot weather. Quarter-plate camera workers may, however, store up another useful hint for the next cold winter, and that is that plates in dark slides carried in an inner pocket of the coat are likely to give more fully exposed negatives than if they are carried in a maga-

zine or leather case, where perhaps their temperature may be reduced to below freezing point.

The system of marking plates with speed numbers must also be considered in connection with the question of temperature. If these numbers are to possess absolute accuracy the tests should be made at some certain fixed temperature, such as 55° or 60° F, and a factor should be supplied with each number, so that the variation that the speed of the particular plate is liable to in extreme changes of temperature may be calculated. With regard to the various kinds of actinometers in which the actinicity of the light is tested by the length of time in which a piece of specially sensitive paper assumes a certain tint, the paper is probably effected by changes of temperature to much the same extent as a slow plate, and the accuracy of the results obtained is therefore not likely to be subject to great variation.

There is, perhaps, one possible application of this discovery that may be of very great service, especially to professional photographers, and that is the use of a hot backing to printing-out papers when printing in very cold weather. Captain Abney has not said anything on this point as far as we know, but some experiments in this direction might give useful results. If the time of printing could be reduced one half this would be a great gain, for at present printing by daylight in the winter months is a very tedious and unsatisfactory operation. There would be little difficulty in arranging the hot backing to the paper if any good results are to be thereby obtained, and some of our enterprising manufacturing firms would not be behindhand in placing the necessary appliances at the disposal of photographers.

It would be necessary to well varnish and warm the negative, and the paper should also be warmed and rendered as dry as possible before being placed in contact. If these points are not attended to, results disastrous both to the negative and the print may be expected.

For experimental purposes the paper might be backed with a hot pad of thick flannel, and the heat kept up by means of a moderately warm flat-iron applied to the back of the pad.—*Photo. Notes.*

DR. JOLY'S EXPERIMENTS IN COLOR PHOTOGRAPHY.

AT the recent soirée of the Royal Society, Dr. Joly's transparencies created great interest, from the fact that they were rendered in the colors of the original. A portrait in its many tints and soft lines was given as effectively as were renderings of brilliantly-colored pansies, and the presentment of a brick house with lawn, and bushes in blossom, in which the rendering of the sky was most successful. Subjects in great variety, to show the scope and capacity of the method, were all equally successful and charming. The principles which have of late been worked upon in the development of composite photography come in here, and the worthy doctor is to be congratulated upon the very close and assiduous attention with which he has worked out a very interesting problem. We are indebted to the *Times* for the following particulars of the method adopted:

The operations involved in the new method are as follows: A transparent glass plate, which, on first inspection, appears to bear a uniform tint and to possess a somewhat silky texture, is placed in front of the sensitive film and in contact with it, when the latter is exposed in the camera. Examination of this plate with a strong lens or microscope shows that it is not homogeneous, but is closely lined over with fine transparent lines of three different colors succeeding each other regularly over and over again and in close juxtaposition. The plates shown at the Royal Society were divided to a fineness of two hundred lines to the inch. This is not sufficiently fine to obviate in some cases a linear texture visible on near inspection of the picture ultimately obtained. A fineness of three hundred lines to the inch practically accomplishes this, as was demonstrated on a photograph of a group of wall-flowers.

The plate which has been exposed under this screen is developed in the usual manner. The result obtained we may regard as embodying in the single minutely-divided linear image all three separate pictures required in the practice of the methods

of composite photography already alluded to, each produced by a special color-selective action. Although possessing this triple character, the negative differs little in appearance from the ordinary negative, or a positive, subsequently obtained, from the ordinary positive or transparency. The exposure in the camera is of course somewhat longer, for it is evident that, whatever principles are employed, only visible light can be utilized in obtaining a photograph in natural colors, and of this a part is stopped by the ruled screen. Hence a well-lit landscape may take from three to five seconds with fairly open stop and rapid lens.

Of course, neither the negative nor positive so far obtained shows any color. But if now a plate ruled in three tints, which again are chosen according to color-vision theory, is correctly applied to the positive, and if we hold the combined glasses to the light, there is obtained the appearance of the original image as a brilliant transparency in natural colors.

The choice of the tints upon the two screens is based upon the now old hypothesis that all our color sensations, of however varied and subtle tints, are referable to the action, single or combined, of but three sensations (fundamental sensations, as they are designated), transmitted to the brain by the color-sensitive nerves of the retina. Such an hypothesis, if true, implies evidently that any one sensation must be excited by a considerable range of wave lengths; for otherwise that band of light, the spectrum, wherein the several wave lengths composing white light are, as it were, sorted out and arranged according to wave length, would appeal to the eye only in the red, green, and violet; intermediate wave lengths, if not competent to excite the primary sensations in the nerves, remaining, of course, invisible. The sensation which we term yellow, excited at a particular part of the spectrum situated between the red and the green, is, in short, explained as a resultant sensation arising from a simultaneous excitation of both the red and green transmitting nerves of the retina. Carrying this idea still further physicists have, by measurements carried out upon normal as well as color-blind vision, succeeded in determining the relative degrees of stimulation experienced by each of the three several color-sensitive nerves, sup-

posing these separately exposed to stimulation by the various wave lengths of the spectrum, or, in other words, by the different visible wave lengths of nature. In Dr. Joly's pictures the curves embodying Koenig's measurements are taken as the basis of the color principles employed. It is sufficient to add that the particular tints chosen for the three lines upon the taking screen are such as will transmit those wave lengths which excite severally the three fundamental sensations and transmit them in the same degree as they excite those sensations. In fact, the portion of the sensitive plate underlying a "red" taking line is excited or acted on by the light rays in a degree proportionate to the degree in which the nerve itself would have been excited to transmit a sen sation of redness if exposed to this minute portion of the image And similarly the green and violet taking lines are more or less transparent to light rays, as these are more or less competent to excite green or red sensation. Tints that will act in this way bear to the eye, exercising its triple apparatus of color vision, an orange-yellow, a greenish-yellow, and a blue-violet color. These, then, are the tints repeated over and over again upon the taking screen.

Opacity upon the negative being interpreted as transparency upon the positive, it results that a deep red object, for example, will be crossed by transparent lines upon those parts of the positive image which interpret the action of the "red" taking line in the negative image. The green and violet lines, on the other hand, will be all represented in the image as opaque areas, for their action, when the negative is being taken, will be to stop all dark-red light reaching the plate, such rays not exciting green or violet sensation.

The operation of placing the ruled cover glass upon the positive is not correctly accomplished when each of the three fundamental colors upon it lies against a linear area which records the selective action of the taking screen for that particular color sensation.

In the case supposed, a red line will cover a clear space, whereas the blue and violent lines will be blocked out. Hence the final result will be the red coloration of the image. In general two

lines will act, as the green and red to produce yellow, or the violet and green to produce blue. Or, again, a pure white object upon the final picture will, when examined by a lens, show the three lines, red, green, and blue, acting with equal brightness. Thus, although neither white, yellow, blue, pink, nor brown, etc., exists upon the covering screen; all these finally appear correctly as they existed in the color of the original object.

The procedure, in fact, is one in which the three "fundamental" colors are impartially supplied by the covering screen; but the previous experience of the sensitive plate during exposure is such as insures the positive plate selecting amongst these colors according to the original colors of the image.

It is in this manner that the inability of physicists to find a sensitive substance which itself will faithfully adopt and keep the colors of the image, is surmounted.

Were such a substance indeed forthcoming, it could not more faithfully reproduce the true colors of nature.

And this leads us to remark that the particular nature of this procedure, resulting in a complete independence of the almost inevitable ultimate fading of pigments, is of no small moment, more especially in the scientific registration of color. For it is seen that the color register is really carried in the silver deposit on the negative or positive, which may, with ordinary care in the photographic manipulation, be rendered quite permanent. And a fading of the tints on the covering screen may at any time be made good by applying a fresh screen. Copies, too, of a picture may be multiplied to any extent.

So far as this new departure concerns the amateur, it is to be presumed that the labor of preparing the screens will not fall to him. His part in obtaining a photograph in natural color will consist in exposing an isochromatic dry plate beneath the ruled screen; and consequently, temporarily or permanently, applying the ruled cover glass. This is an easy operation. Indeed a very little practice enables one to do this so readily that it is quite possible to run through a series of lantern plates at an exhibition with the aid of but one covering screen, adjusting and temporarily clamping it over each plate before it is put into the lantern.

THE PHYSICS AND CHEMISTRY OF DEVELOPMENT.

III.

BY THOMAS BOLAS, F.I.C., F.C.S.

(Continued from page 321).

ACCORDING to the Hertzian view, light tends to produce alternating currents in any masses of conductors or electrolytes upon which it impinges, provided that there is a certain harmony or syntony between the masses and the radiating source of the light. Now, these alternating electric impulses, whether they are actual currents or mere electrical attempts to be brought into fruition by side influences, such as Sytenko premised, tend to continual loosening of the ions in alternating directions; and that separation by the action of light, which we call *photolysis* or separation by light, appears only to take place when there is some influence at work which tends to remove one of the constituents from the field of action. Indeed, I do not think there is any instance of separation by the action of light—photolysis—unless we have a collateral influence at work tending to separate one of the constituents. This collateral influence, whether it is chemical or physical, is called the sensitizing influence. Take the case of chloride of silver, which has been known for I think something like fifty years not to be decomposed by the action of light. The late Dr. A. S. Taylor, of Guy's Hospital used some forty years ago to show a sealed tube containing dry chloride of silver which had been constantly and for a long period exposed to the action of light, and there was no blackening whatever. When you have water present a second reaction steps in; the water tends to take hold of the chlorine, the mass of chlorine in the act of liberation unites with the hydrogen of the water, or some of it does, and there is a tendency to the liberation of oxygen. This is probably what takes place where light acts on any haloid of silver.

Now, if you have excess of the haloid present you do not get photolysis of the silver salts; that is to say, excess of chlorine, excess of bromide, or excess of iodine, will prevent the decompo-

sition by the action of light,—still more, excess of any one of these haloids will undo the action of light, that is to say, it will restore the decomposed haloid salt. Now, in decomposition by heat an analogous condition does not hold good,—the presence of the substance liberated very often has no influence whatever on the decomposition by the action of heat, and here is a familiar lecture-room illustration.

In this flask there is a hydrate of copper prepared by precipitating a solution of sulphate of copper with caustic potash. Perhaps Mr. Beard will be kind enough to through a light on it, and you will see it has a distinct blue color. This cupric hydrate is generally represented thus: $Cu\ H_2\ O_2$; and under the action of head simply decomposes into $Cu\ O + H_2O$. You must remember that the hydrate of copper, which is blue, is floating in excess of water; that is to say, it is in the presence of one of its decomposition products. Now apply a gentle heat, and note the effect. The effect of the gentle heat is to decompose the hydrate of copper, which is blue, into oxide of copper, which is black, and into water which adds itself to the general mass. Now, as far as I know, nothing strictly analogous to this occurs in the case of decomposition by the action of light. Decomposition of the hydrate of copper—thermolysis—takes place rather below the boiling point, so the tendency of the water to fly off as vapor does not count. This is quite analogous to the decomposition of the mercuric oxide by heat, only here you have in a more marked way an excess of one of the decomposition products.

We now come to a very remarkable property of the Hertzian waves of light, that is to say, they cause particles of conductors to cohere; and this is true—it has been thoroughly established—of the long Hertzian waves and of the short waves which we ordinarily call light. Faraday really went over a great deal of this ground, and his experiments have been themselves a base for the Hertzian view, only we can now be fairly certain of the full identity of the induction impulses and light, and that these impulses can be polarized, that they can be refracted, that they can be reflected, and also, what is more important still, that they travel at the rate that ordinary light travels. Another important

property of these Hertzian or induction waves is, that they cause the conductors from which the secondary discharge takes place to cohere slightly. Supposing the Hertzian waves are exicted in a mass of metal filings, there is a tendency for those filings to cohere, and the filings as a whole become a better conductor. This has been fully established by Lodge, and after he established it a number of old experiments were recalled which more or less confirmed it. Lodge demonstrates this by what he calls a coherer, and Lodge's coherer is something like this: Here is a plate of metal, and a wire just rests upon it very gently, its axis being capable of being turned so that the pressure of the wire on the metal can be adjusted. Suppose the pressure is adjusted so that an ordinary current from a single cell just will not pass; if you subject the coherer to the influence of the Hertzian oscillations the result is there is a minute discharge and the particular pieces of metal cohere sufficiently to make a circuit for the electric bell current. The electric bell current merely recognizes the fact of the cohesion.

Here are two cylinders of metal, two brass tubes, supported on an ebonite rod; these are connected with a Wimshurst machine, and if one turns the machine there will be a periodic discharge between these two conductors. Under these circumstances, the inductors being in the focus of that parabolic mirror, you get the mass of waves reflected in a parallel direction to the other parabolic mirror, and in the focus of that there are two pieces of metal between which a minute discharge will pass, and a discharge which perhaps will be strong enough to produce a sensible cohesion and a ringing of the bell.

Now, the same kind of thing has been known for a long time in connection with light. It has long been known that selenium when in the metalline condition has its conducting power for electricity somewhat increased under the influence of light. A number of facts like this have been known for some time, and Lodge has gathered them together, added to them, and he appears to have arrived at their true significance. For details I must refer you to his little book on "The Work of Hertz."

Oliver J. Lodge, looking at all these things, has put forward

with some diffidence a theory of vision which appears to give a clue to the real action of the developer on the exposed surface. Lodge suggests that in the eye, that is to say, on the retina, there are certain conducting particles—or perhaps we should say gaps which become conducting under the action of light,—which can cohere when light impinges; and according to the ordinary view of color sensation these organs should be three-fold, that is to say, there should be one for each of the primary color sensations. When light impinges, we have the effect of closing the circuit of an electrical organ in the eye. In this case the action of light on the eye would be a relay action, and not a directly kinetic action.* There is very little doubt, I think, going on the experiments of Meldola, Abney and others, also the speculations of Armstrong, that the action of the developer is an action largely depending on the closing of an electric circuit. Meldola impressed minute particles of silver on a gelatino-bromide surface, and then subjected the plate to the action of the developer. Under these circumstances the plate developed where the particles of silver were impressed. You may look on the particles of silver as closing an electric circuit, and then we have an analogue with that form of voltaic battery which consists of two fluids or substances capable of reacting—we will say caustic potash and nitric acid; and a connecting link, say of platinum. Now, let one of these liquids be the particle of silver haloid, and the other the developing material; the developing material is a substance capable of taking away chlorine, that is to say it is a reducing

* Lodge says (Work of Hertz, p. 26-27): "I therefore wish to guess that some part of the retina is an electrical organ, say like that of some fishes, maintaining an electromotive force wh ch is prevented from stimulating the nerves solely by an intervening layer of badly-conducting material, or conducting material with gaps in it; but that when light falls upon the retina these gaps become more or less conducting, and the nerves are stimulated.

"I must not try to make the hypothesis too definite at present.

"You observe that the eye on this hypothesis is, in electrometer language, heterostatic. The energy of vision is supplied by the organism; the light only pulls the trigger. Whereas the organ of hearing is idiostatic. I might draw further analogies between this arrangement and the eye, *e.g.*, about the effect of blows or disorder causing irregular condition and stimulation." Lodge's suggestions as to the bearing of this view on persistency of vision, and the fatigue of the selenium cell, are specially interesting, although perhaps to quote them would be going wide of my special subject; still it is not unlikely that the permanency of the latent image may be partly analogous.

substance, capable of taking away chlorine, and in order that this may act with facility you require a conducting link, and this Meldola's particle of silver gives this conducting link. Similarly, you may perhaps take it that the minute particles of silver liberated by the action of light on the haloid in the presence of the sensitizer cohere under the action of light and give the conducting link: thus uniting in one inseparable whole the "Chemical Theory" and the "Physical Theory" of the latent image.

In this outer cell is some caustic potash; in the porous cell there is nitric acid; the porous wall is merely a convenient means of preventing the immediate mixing of the two. These will act on each other very slowly, unless they are connected by a conducting link; and I am going to dip a platinum plate in each, these platinum plates being connected with the galvanometer coil, and I think you will see there is an indication of a current passing. This, according to Meldola's view should be a picture of the action of the developer on the exposed film—a physical picture of the action of the developer.

Development is an exothermic action; that is to say, the total result is that heat is given out in the action; and Meldola's particles of silver, or the minute particles of metallic silver which we may assume to exist in the exposed plate, serve as the conducting links, and these links tend to cohere under light impulse. At any rate, I think this is the lesson that we may learn not only from Meldola's experiments, but also from Lodge's view of the action of the eye, which he puts forward not as a studied and complete view, but as a hypothesis which may be verified or may be disproved, not as a final conclusion but as a suggestion.

Before altogether leaving the Hertzian aspect of the case I think that, with the help of Mr. Child Bayley, I can show you at any rate how it has been demonstrated that the electrical oscillations can be refracted. I think Mr. Child Bayley was more successful this afternoon in finding the best refracting angle of this paraffin prism than I was, so I will get him to see if he can extinguish the induced spark while I turn the handle of the Wimshurst machine. Now Mr. Bayley will try to extinguish the spark by holding the paraffin prism at such an angle that the

waves are refracted away from the receiving conductors. I am sorry to say it is not practicable to do this so that you can all see; but I understand that the Chairman says the spark went out when Mr. Child Bayley got the prism at a certain angle, and came back again when he removed the prism. At any rate, you may take it, quite apart from the result in this case, that the refraction, the reflection and the polarization of these electrical oscillations are an undoubted fact now firmly established.

We may now come to a few considerations on the various methods of development as far as they appear to involve separate and distinct principles. Let us go back to the first definitely photographic experiments on record—those of Nicephore Niepce, about the year 1810. About 1810, Niepce was very enthusiastic on the subject of lithography. Sennefelder, who worked some few years earlier, had introduced lithography as a printing method, and Niepce was impressed with the importance of the method and tried to apply photography to it by taking advantage of the known sensitiveness of a peculiar varnish to the action of light. Now, the process of photography discovered by Niepce about 1810, was brought to a considerable degree of perfection by him about 1813, and he brought specimens (some done in the camera) to England about 1827 which he tried to get shown at a meeting of the Royal Society; but it did not come off; the Royal Society has always been a little conservative, perhaps properly so, and these things were not brought before the Society. The first photographic process, brought to very considerable perfection by Niepce as early as 1813, involves an interesting principle. Here is a copper plate which has been covered over with a thick layer of bitumen, that is to say, a layer of varnish which may be roughly spoken of as Brunswick black; as a matter of fact, it consists of Trinidad natural pitch dissolved in benzole and poured over the copper-plate—there is a pretty thick layer of it. Two pieces of red paper were laid on the plate, and the plate was exposed to light. There is a very slight visible image, the bitumen is a little darker where acted on by the light, it has undergone oxidation, it is not a case of ordinary photolysis, the bitumen has

absorbed oxygen from the air.* Now, if we take a suitable solvent we shall have an illustration of the simplest and earliest type of development. If were to take such a solvent as the pure oil of turpentine, or benzole, it would dissolve off the whole of this film at once, and from ten to twenty times the exposure this has had would be necessary; but I will take a much milder solvent, some turpentine which is very old indeed, old and thick, and oxidised, and I will pour a little on the plate. The turpentine is quite viscous, and I spread it with a brush. This thick viscous turpentine is now softening the bitumen where the light has not acted, and it is not softening very much the portions which have been acted on by light. The developing of softening is beginning, and probably the insolublising action of the light is quite sufficient to enable me to wipe this with a cloth and leave the image. You see, it comes off where the film has been protected from the action of light; if we poured benzole on it, we get the whole thing dissolved off, as you see now.

With longer exposure you can quite easily get a solid image with a full gradation of half-tone by the process of Niepce, like a "carbon" print in fact. Here is a little bitumen image, which was exposed under a half-tone negative, which shows all the gradation of tone of the original. The bitumen is transparent, and the image is not very intense, but I will show it in the lantern and then pass it round, and you will see how completely all half-tone can be rendered by this process of Niepce.

To be continued.

A large sized photograph of Mrs. John Drew has lately been issued by Gutekunst, the Arch street photographer, which represents that versatile, talented, estimable and veteran actress in a truly pleasing manner. It shows her in just the way she should be portrayed—as a quietly dressed, little old lady, nothing that bespeaks her profession showing in the picture. Her talent and cleverness are shown in every line of the strong and expressive face. The likeness is excellent, and it is a thoroughly noteworthy picture of Mrs. Drew as she is seen in every-day life at the present time.

* We do not know what is the action of light on the bitumen; but it may be a case of photolysis, one of the ions becoming oxidised by the air; the air thus acting as a sensitiser.

A PROMISING PRINTING PROCESS.*

HECTOR MACLEAN, F.G.S.

TWO reasons have impelled me to bring before your notice a paper, and a particular method of toning it, regarding which I ask the favor of your attention.

The first reason is that my own experiences and the observation of other people's experiences have led me to be very much dissatisfied with the gelatino-chloride paper at present so largely used. Without entering deeply into all the objections to the above paper present to my mind, enough that they include a considerable tendency to double tones, an oftentime unpleasing color of tone, and a frequent inclination to give hard prints where negatives of full pluckiness, such as are usable with platinotype or albumenised paper, are printed from. Above all, however, is the feeling that no reliability can be placed upon the permanency of the image impressed on the gelatine paper, of which more anon.

The second reason which led me to address you is that my attention was very forcibly directed to the advantages possessed by collodio-chloride paper by our much-esteemed member, Mr. Harry Letts. Lately returned from a long stay in Switzerland, he favored me with an inspection of a number of whole-plate Alpine views—many of which have been reproduced in the sixpenny illustrated London weeklies—which at first sight I took to be platinotypes of remarkably high quality, as regards full range of vigor and fine rendering of the nicer passages of half tone. Mr. Letts, however, quickly disabused my mind, informing me that nine-tenths of his collection were collodio-chloride prints toned by the method I shall presently explain to you. I could have wished that my task had been undertaken by Mr. Letts himself, who was most willing to take it upon himself, but pressing engagements have called for his presence in a distant part of the country. I have therefore refreshed my memory regarding this particular paper, and have made some trial of the brand of paper and the system of working which Mr. Letts has adopted with so much success.

* Read before the Croydon Camera Club.

It will, perhaps, be not amiss if, at the outset, I say a few words respecting the comparative virtues of collodion and of gelatine sensitised papers. It should never be lost sight of that, as Mr. W. J. Wilson points out, the disadvantages of gelatine chloride paper are due partly to the physical and partly to the chemical properties of gelatine; thus it absorbs water with great avidity, the film freely swelling and softening when wetted; hence not only is the surface liable to injury until bone dry, but the interstices of the swollen layer of gelatine become difficult of access to the washing water, which cannot readily, if at all, remove all the soluble matter which should come away; this same physical characteristic is partially the reason why uneven toning frequently ensues.

The light half-shadows lying more upon the surface of the gelatine film are soonest reached by the toning agent, whence toning not only begins, but is finished, before the fluid employed in the toning has permeated far enough into the congested mass of gelatine to reach the deeper-lying parts of the image which composes the dark shadows. It follows that, in order to tone the latter, the treatment is so prolonged that the half-lights become grossly over-toned, with the usual result of an unpleasant, flat, and cold appearance.

Collodio-chloride paper is coated with a film which is of a non-absorbent, non-swelling character, and is one of considerable thinness as compared with the gelatine papers. Hence preliminary washing, being unimpeded, is thoroughly carried out in a short time, little or no unacted-upon silver being left in the film; for the same reasons the hypo is much more quickly and thoroughly eliminated; moreover the toning bath is able to act with facility and simultaneity upon all parts of the image.

As regards the purely chemical advantages of the collodion over the gelatine paper, it is here enough to state that gelatine has a strong tendency to enter into chemical combination with the soluble salts of silver; such combinations are of imperfectly known character, but frequently produce undesirable results. On the other hand, collodion associated with the silver salts forms a comparatively stable combination, practically entirely free from

the objection urged against gelatine, and also in part against albumenised paper.

The experiments and tests which I have applied to the paper used by Mr. Letts—which is known as the Paget collodio-chloride matt paper—were directed to elucidating: (1) With what facility and regularity the toning of prints could be effected; (2) what scale of tonality the paper possessed in comparison with other papers in ordinary use for printing.

The sample I tried printed slightly quicker than the ordinary gelatine papers on the market. In my hands—that is with the negatives that I employed—there was a slight tendency in some cases to discoloration of the high lights, due to the fact that the negatives were not fully suited to the paper.

In the course of the first washing the prints seemed to lose less vigor than usual with gelatino-chloride prints. The toning I found to be notable for its rapidity and for the regularity with which all portions of the print were affected. The sulphocyanide bath used between toning and fixing did not palpably reduce the strength of image, nor did the fixing bath to anything like the extent to which gelatino-chloride prints are so affected.

The procedure is quite simple to understand and perfectly easy to manipulate. The following stock solutions are used:—

PLATINUM STOCK.

Potassium chloro-platinite - -	15 grains.
Dilute phosphoric acid (B.P.) - -	3 ounces.
Water *up to* - - - - -	15 ounces.

GOLD STOCK.

Gold chloride - - - -	15 grains.
Dilute hydrochloric acid (B.P.) -	8 drachms.
Water up to - - - - -	15 ounces.

For use of each twelve parts take—of gold stock, 1; platinum stock, 3; water, 8.

The print is washed for not exceeding five minutes either in running water or by means of several changes, using two dishes.

It is then immersed in the toning bath. Several prints may be manipulated at once, providing care is used. In my own case

1895.

EVERY DAY CHILD STUDIES.

FROM THE "HEMEERLY STUDIO,"
820 ARCH ST., PHILA.

one occasion small portions of the collodion chipped more or less round handing, inevitable when... are treated all at once in a small dish. The ... complete in about two or three minutes, more or less; ... fore, small reason for fixing a dozen with an occasional ... of prints.

... rinsed the prints for not less than five minutes, they ... to a bath consisting of

... cyanide of ammonia ... ounces,
... ounces,
... pint.

... four minutes. The object of this bath is to ... *toughen further* ... the prints are next put in

... ounces,
... small quantity,
... pint.

... minutes is time enough for fixing. If ... to the ... reduction of the image takes place.

... wash from two to four hours.

... the above operations I have to caution the ... to ... allow anything to act roughly upon the ... of the ... as there is a distinct liability on the ... to soften ... from a powerful stream of water rising upon a ... of prints ... loose pieces of the collodion to chip off, either in consequence of the edge of one print violently striking the face of another or through the heavy impinging of a jet of water.

A considerable merit in the eyes of many is that the paper can be rapidly dried by blotting off and mounted right away, or moderate heat may be applied to hasten the drying.

The second point which I directed attention to, viz., how the quality of this paper compares with others, I tested by obtaining two prints from the same negative upon the collodion paper, and the other upon platinotype paper, normally developed in the usual bath.

The conclusion I arrive at is that the collodion paper yields a softer image than does the platinotype. In other words, where a negative is slightly too hard to give a quite satisfactory print with platinotype, the collodion paper will give one just about right.

on more than one occasion small portions of the collodion chipped off, due to the more or less rough handling inevitable where a number of prints are treated all at once in a small dish. The toning is complete in about two or three minutes, more or less; there is, therefore, small reason for filling a dish with an unmanageable mass of prints.

Having washed the prints for not less than five minutes, they are soaked in a bath consisting of

Sulphocyanide of ammonia - -	½ ounce,
Water - - - - - -	1 pint,

for three or four minutes. The object of this last is to clear the whites. *Without further washing*, the prints are fixed in

Hyposulphite of soda - - -	3 ounces,
Bicarbonate of soda - - -	small teaspoonful,
Water - - - - - -	1 pint.

About ten minutes is time enough for fixing. If too long in the bath, a reduction of the image takes place.

Finally wash from two to four hours.

In all the above operations I have to caution the photographer not to allow anything to act roughly upon the surface of the print, as there is a distinct liability of the film to suffer abrasion. Thus, a powerful stream of water falling upon a batch of prints may cause pieces of the collodion to chip off, either in consequence of the edge of one print violently striking the face of another or through the heavy impinging of a jet of water.

A considerable merit in the eyes of many is that the paper may be rapidly dried by blotting off and mounted right away, or moderate heat may be applied to hasten the drying.

The second point which I directed attention to, viz., how the tonality of this paper compares with others, I tested by obtaining two prints from the same negative upon the collodion paper, and the other upon platinotype paper, normally developed in the cold bath.

The conclusion I arrive at is, that the collodion paper yields a softer image than does the platinotype. In other words, where a negative is slightly too hard to give a quite satisfactory print with platinotype, the collodion paper will give one just about right.

I present for your inspection the two prints above referred to, and taking as a standard common to both the white linen object drying on the wedge, which is the highest light, and which comes white in both prints, and the perfect blackness of the barn door, also fully rendered in the two, you will notice that the scale of high-light tones is somewhat shorter with the collodion than with the platinotype, At the same time I consider the range between half-light and half-shadow is more extended in the collodion than the platinotype; this is a quality to be much commended.

Our worthy Secretary, Mr. H. E. Holland, has undertaken to bring to your notice to-night some trials which he has given to this same paper, using an ordinary sulphocyanide and gold bath; for you must know that, although I have confined myself to the platinum gold toning, the paper is freely amenable to almost any bath, and tones in ordinary baths all the more easily because there is no need, as is necessary in manufacturing gelatine paper, to add any acid as a preservative to the film; hence the paper itself does not tend to acidify the gold bath, which, as you are aware, would *pro rata* help retard the toning action of the alkaline solution usually employed.

Before proceeding with my demonstration, I would, in conclusion, add that so far as an examination of the theoretical advantages of collodion compared with gelatine goes, and so far as a practical and careful trial carries me, I am inclined to predict that it is to collodio-chloride paper we must look for the printing medium of the future.

The merits which are likely to carry it into favor are ease of manipulation, certainty of resulting tone, rapidity with which the print can be finished off, and lastly, the assurance that its permanency is far in advance of the average of gelatino-chloride or albumenised prints.

The young American artist, Malcolm Frazer, has been made a Professor of Fine Arts by the City of Paris. He is a painter of considerable promise and has studied under Benjamin Constant and Jules LeFebvre. He is a son of W. Lewis Frazer, the art manager for the *Century Magazine.*

THE HALF-TONE THEORY.

HALF-TONE workers have plenty of food for thought just now, for the process is about turned inside out by scientific investigation. Mr. Levy's article in our *Year Book*, together with the very able monograph of Dr. Eder's translated and reprintrd in the *Process Photogram*, and the paper of Messrs. Tallent and Dollond at the Royal Photographic Society, leave little to be done in solving the problem. It is quite evident that a number of workers have been simultaneously pursuing a course of investigation, and none ought to claim any especial credit for being first in the field. In fact, publication of results of all these investigations has been curiously coincident. There has certainly been more divulged on the "secrets" of half-tone work during the past month or two than ever before. The question naturally occurs, What does it all amount to? Well, to any really practical and intelligent operator who has been "inside" the business during the period half-tone has come into vogue, there is nothing particularly novel in the matter published. The only thing is that scientific data have been furnished to replace rule-of-thumb and guess-work. In this respect the investigation is valuable. Let us summarize the results. Eder proves that the focus of the lens used for half-tone should not be less than 16 inches, and states that the best results are attained with a lens of 24 inches. Of course, half-tones *can* be made with shorter-focus lenses, but there is always an exact "best," and this is what Eder has tried to discover. Half-tone negatives from flat, soft, shadowed originals should be made with large diaphragm apertures, whilst deep-shadowed, full of contrast originals, should be photographed with smaller diaphragm apertures. The correct aperture for a screen of 150 lines to the inch, and the best possible distance from the sensitive plate is, approximately, *f*-11 to *f*-13 or *f*-14. In extreme cases, where the lights are required to be more strongly covered, *f*-9 may be used. When it is desired to bring out the shadows better at the cost of the high lights, *f*-15 will be suitable. With coarser screens, such as 120 lines to the inch

apertures of *f*-12 to *f*-14 are the best, which may, with subjects full of contrast, be reduced to *f*-15. It must be borne in mind that these calculations are based on the screen being very close to the plate. This is rather contrary to usual practice. Eder says: "For normal pictures the distance of the lineature should be kept to that which is determined by the thickness of the lineature plus the wires which hold it in its place. For very flat subjects the distance should be increased, for instance, by laying in a strip of four-sheet cardboard between, this being equivalent to thickness of two-thirds millimetre. For wash drawings a card of one-third millimetre is sufficient. But, to a certain extent, the increase of distance of the lineature may be replaced by increasing the ratio aperture of the object, as already described. Yet doubling the diameter of the diaphragm aperture does not double the size of the dot; the latter increases only in the proportion of 3 to 4. Eder further proves the fact that the spaces of the screen act as pin-hole lenses, and reproduce the shape of the diaphragm; also that the size of the negative dots is independent of their position on the plate, and that their diameter is equal to the width of a lineature opening increased by the diameter of a minute image of the diaphragm. The dots run into one another with a certain size of diaphragm. The exact size of the dot necessary to overlap can be calculated from the following formula:

Let $m'\,n'$ = the diameter of dot in the negative, M N = the diaphragm diameter, $a\,b$ = the size of aperture in the cross-lined screen, ∂ = the distance between the lineature and plate then

$$m'\,n'' = a\,b + \frac{\mathrm{M}\,\mathrm{M}\partial}{2f}$$

The remainder of Dr. Eder's paper is devoted to a repetition of Mr. Levy's deductions on the influence of diaphragm aperture, as published in the *Process Work Year-Book*. Dr. Eder says: "I am convinced that the statements of this expert are as exhaustive as they are satisfactory, and I use his illustrations and arguments herewith." In France too the subject of the half-tone theory seems to have been receiving consideration. We have received a pamphlet, dated April 1, 1895, by M. Ch. Fery, en-

titled *Sur les Reseaux quadrillés employés en Photogravure.* The writer thinks that the influence of diffraction is a negligeable quantity, and that, if we consider the diaphragm as a luminous source, the elementary theory of shadows will explain all the peculiarities observed. The phenomenon is, however, complicated by the action known as irradiation, the molecules of silver in the film becoming luminous sources and acting on one another. On the whole, M. Fery thinks that the phenomena of irradiation, together with variations of the luminous intensity of the penumbra in different parts of the photographic image, explain the effects of the encroachment of the light on the parts protected by the shadows of the black lines. The equality of the triangles formed by the rays emanating from the edges of the diaphragm, and crossing the edges of the square openings of the screen, easily permits a formula to be prepared showing the necessary conditions. Let e equal the distance of the screen from the sensitive plate, a the thickness of the lines of the screen, f the focus of the lens, and d the diameter of the diaphragm. Then

$$e=\frac{af}{3d}$$

These equations relating to the theory of half-tone appeal perhaps only to a few workers, and it is to be regretted that, for the benefit of the majority, the terms cannot be put in a more popularly understandable manner.—*Process Work.*

She—These horrid photographs don't do me justice at all. He—My love, it's not justice you stand in need of—it's mercy.—*New York Ledger.*

"**The** telephone is like a woman; it tells everything it hears." "Yes, that's so. And it's unlike a woman, too; it tells a thing just as it hears it."—*Life.*

"**Is this** where you vote?" said an Ohio voteress to the election officer. "Yes, ma'am." "Then please cut off samples of all the tickets and I'll take them home and see which I like best."—*Pittsburg Chronicle Telegraph.*

MERCUROGRAPHIC METHODS OF PHOTO-ENGRAVING.

THOMAS BOLAS, F.I.C., F.C.S.

PHOTO-ETCHING processes based either upon the increased readiness with which amalgamated portions of metal plates dissolve in some acid or the greater resistance which they offer to other acids, have been known for some years, but recently Mr. Villon has classified such methods, and so far simplified some of them as to render them easily serviceable for the ordinary work of the etcher, and moreover the application of photography to these methods is a very easy matter. The basis of the process in its non-photographic aspect may be illustrated by a few examples. An ink is made by smoothly mixing together the following :

Water - - - - - -	100 grains.

Add and dissolve

Sugar - - - - - -	50 grains,
Glycerine - - - - -	50 grains,
Alcohol - - - - -	100 grains.

Finally mix in

Precipitated Binodide of Mercury -	40 grains.

Or a crayon can be made by incorporating

Binodide of mercury - - -	100 grains,
Mercurious nitrate - - - -	10 grains,
Powdered gum - - - -	20 grains,

Water, a sufficient quantity to make a stiff paste.

With either of the above, writing or drawing is executed on a polished zinc plate, with the result that the subject shows as bright amalgamated lines on the bluish-gray surface of the zinc, and such a plate, having been varnished at the back, is etched with 3½ per cent. nitric acid, or with hydrochloric acid of similar strength. The weak nitric acid attacks the amalgamated lines and gives an engraving in *intaglio*, while the weak hydrochlorate attacks the ground and gives an engraving in relief, adapted for typographic printing. In either case, should the lines show signs of bring underbitten, the plate should be washed, wiped dry with a soft cloth, and carefully rolled over with the following

rebiting ground, care of course being taken to use a hard, smooth roller, and not to let the rebiting ground go into the etched cavities. A little heat will cause the rebiting ground to flow down the sides of the relief, and so protect them; after which the etching is resumed.

REBITING GROUND.

Vaseline - - - - -	100 grains.
Bees-wax - - - - -	12 grains.
Linseed oil - - - -	5 grains.
Lamp-black - - - -	5 grains.

When an original is to be reproduced by photography, a photo-lithographic transfer is made and put down upon stone or metal in the ordinary way, but instead of inking up the design with an ordinary lithographic printing ink, the following is used:

LITHOGRAPHIC AMALGAMATING INK.

Wax - - - - - - -	40 parts,
Resin - - - - - - -	30 parts,
Resin soap - - - - - -	20 parts,
Biniodide of mercury - - -	10 parts.

A print is now taken on transfer paper and put down upon a zinc plate. In two or three hours the lines become amalgamated, the image is washed with turpentine, and the plate is etched as above. Alternatives are to use the above amalgamating ink in the preparation of the original photographic transfer, or to dust the face of the transfer with biniodide of mercury. Again the transfer may be made to zinc or copper with an ordinary fatty ink, and the image on the plate may be dusted with the biniodide of mercury. Another method is to treat the plate as for the ordinary dusting-on process (a gum or sugar and bichromate mixture), and, after exposure, to dust with the biniodide of mercury. When the amalgamated image is on copper several methods of printing are available, but the simplest consists in rolling up the amalgamated copper with ordinary lithographic ink, which will only take on the unamalgamated parts, but the amalgamation must be kept up by occasional damping with a weak solution of mercurious nitrate, or by carefully dabbing it over with the preparation known to the pharmaceutical chemist, as "mercury with chalk."

The Editorial Dropshutter.

Our Frontispiece.—"Where the Sea Waves Break," a scene on the New Jersey Coast, near Atlantic City, is a reproduction of a negative by Mr. A. H. Phillips, an amateur photographer, residing at the latter place. Mr. Phillips has made a specialty of wave studies, and has obtained some of the finest results on sea-scapes upon our immediate coast. We expect in the near future to reproduce another of Mr. Phillips' fine effects.

Jahrbuch fur Photographie u. Reproductionstechnik for 1895, by Dr. Joseph Maria Eder, with 162 illustrations in the text, and 25 artistic plates illustrating the various reproduction processes. Published by William Knapp, Halle.

This Annual that takes precedance over all German contemporaries, in the present year surpasses all former issues. It is a volume of over 600 pages filled with original contributions, formulæ, and practical advice, covering every department of the photographic art-science. Dr. Eder is to be congratulated upon his success. Great credit is also due the Knapp establishment for the manner in which the Jahrbuch is gotten up.

No photographer, professional, advanced amateur, or scientific student who is conversant with the German language can afford to be without it.

Snap-Shots.—With the current issue our sprightly contemporary *Snap-Shots* completes its second year. Mr. Laury MacHenry is to be congratulated upon his success. The pages of this periodical are always clean and interesting, and it has our best wishes for a long term of prosperity.

Art is long; but is not always long enough to make both ends meet.

Ross Lenses.—A catalogue of these well-known photographic objectives has been received from Gennert, of New York, who is the sole agent for the United States. The pamphlet is filled with information upon the various systems made by them and their application to the various branches of photography.

Photographic Scissors and Paste.

Photography and Bank Note Printing.—Mendel Howard, formerly residing in Ohio, who was apprehended in Chester Terrace, Eaton Square, where, it was alleged, he carried on the manufacture of forged bonds, bank notes, and foreign postage stamps, was brought up at Westminster on Tuesday, 28th ult., for further examination. Mr. Hans Hersman, chief inspector in the Imperial Printing and Engraving Department, Berlin, gave evidence as to photographic negatives and positives on glass and prints of German bank notes, etc., included in the seizure at the prisoner's house. Mr. Osborn, for the prisoner, asked whether the German Government or the Bank of Germany, paid a handsome sum to anybody who could invent a process by which the forgery of notes was made impossible. Witness said he did not know. Probably they would. The copied notes were not printed on paper which resembled that used by the bank. Police Sergeant Lowe, an officer who assisted in the search at the prisoner's house, said he found a locked iron chest in the room which Howard used as a workshop. Prisoner said there was nothing in the chest, but when it was opened it was found to contain a complete set of plates for printing 1,000f. notes. Witness said, "What do you call these?" Prisoner laughed, but made no reply. Cross-examined: Among the prisoner's papers were letters showing that he had been concerned in many inventions and patents. There was a letter from Mr. Campbell, Governor of Ohio, with reference to one invention. Particulars as to the prisoner's career in America had not yet reached this country. He told Inspector Jarvis that he was an experimentalist. The landlord of 57 Chester Terrace, which the prisoner rented under an agreement, proved that Howard was described in that document as a civil engineer. M. Jules Hennet, chief of the Financial Department of the City of Brussels Administration, and delegates from other Belgian cities whose copied bonds and coupons were discovered in the prisoner's room, gave expert evidence relating to the documents and photographs in evidence. The prisoner, who reserved his defence, and called no witnesses at the court, was committed for trial.

"Baby Ruth's" Photographs.—The Washington *Times* says: The fact that Mrs. Cleveland had to resort to a ruse a year ago of sending her little daughter Ruth to a Washington photographer in charge of a friend, so that her identity might remain unknown, and

all possibility of having the pictures on sale be thus avoided, does not by any means indicate that the set of pictures so obtained are the only ones extant of the little maid. Quite the contrary is true, for the President and Mrs. Cleveland have a voluminous collection of pictures of both their children. This is especially true in regard to Ruth, whose pictures have been taken at frequent intervals ever since she was born. Dr. Bryant has been the photographer in this case, and, as he is a most accomplished amateur in this line, the results have been most satisfactory. Dr. Bryant has in his possession a collection of his own work which will be of inestimable value, as it includes pictures of which there can be no duplicates in existence. These are of the President and Mrs. Cleveland, having been taken from time to time since their marriage. Some of the best are those taken during the time the President and Mrs. Cleveland were roughing it during their stays in the Adirondacks.

The Illustrated Press and Photography.—The opinions of a man like Sir W. Ingram, the director of the *Illustrated London News* and other well-known pictorial publications, with reference to the use, for illustration purposes, of reproduced photographs, must command much attention at this juncture. He was the subject (or victim) of an interview recently published in the *Publishers' Circular*, and here are his utterances on the question immediately concerned :—

"'What is your opinion about photo-process work, Sir William?'

"'I think that the public will in time become tired of mere reproductions of photographs.'

"'You think, then, there is a good time coming for artists?'

"Yes, and there will arise a new school of artists who will be required to compose drawings from photographs. These photographs may be portraits or photographs of events. Of course, this will not cause the former demand for wood-engraving at once to revive, as, in many cases these original drawings will be reproduced by what is called the etching process. At the same time, it is my intention to introduce into the pages of the *Illustrated London News* more wood-engravings than have appeared for some time past.'"

The opinion that the public will in time tire of reproduced photographs has been more than once expressed in these pages. Sir William's determination to make an increased use of wood-engravings is just what an intelligent student of the better-illustrated papers might have expected, in view of the enormous number of indifferent photographs which have lately been used for reproduction purposes. Some

illustrated newspaper conductors appear to think that any photograph is good enough to be reproduced—or is it that really good photographs are not forthcoming in sufficient numbers?

Measuring Stellar Photographs.—In reading of the measurement of the photographs taken for the great map, a non-expert would see no difficulty in the matter. But such is not the case; the work is difficult, and the apparatus expensive. At a recent meeting of the British Astronomical Association, Professor H. H. Turner, in a paper which he had forwarded, described a simple apparatus for measuring stellar photographs. In the course of some general remarks he pointed out the importance of amateurs choosing and working at a small spot in the sky. Various forms of microscopic micrometers, he said, had been proposed for the measurement of position of objects on the photograph, but the simplest of these used in large observatories would cost at least 20*l.* Suggestions for reducing an item of expenditure of this magnitude would probably, therefore, be welcome. A *reseau* was almost indispensable, but the expense of one for an individual would be serious. But why should not the Association purchase such a *reseau* or *reseaux*, and furnish photographic copies to its members? In the actual measurement some microscope must be used, but most of them could find an old microscope somewhere, and it was only further necessary to place a small scale in the common forms of the objective and eyepiece. He gave directions for making such a scale photographically, and, concluding his paper, he said a complete outfit for taking and measuring stellar photographs was well within the resources of any one, and that there was work to be done with it at the present time unlimited in scope, and certain to produce good results.

Photography at Greenwich.—According to custom, the annual visitation was made at Greenwich upon the first Saturday of this month, and many points of interest photographically were touched upon. It was mentioned in the last report that a new photographic telescope of twenty-six inch aperture, the generous gift of Sir Henry Thompson, had been ordered for the observatory from Sir Howard Grubb. The object glass had been made and delivered, and good progress had been made with the mechanical work. The work for the great star chart does not seem to have been so successful as might be expected from skilled observers, for we read that, while with the astrographic equatorial of the International Photographic survey 595 plates have been taken on 125 nights, of these 162 have been rejected from atmospheric or other accidental causes. The region of the heavens alloted to Green

wich for the survey is that within 25° of the North Pole, and the work is now far advanced, at least so far as the plates of the Catalogue series, to show stars down to the eleventh magnitude, are concerned. In the case of the plates for the chart of stars down to the fourteenth magnitude, which require forty minutes exposure, progress has, for obvious reasons, been somewhat less rapid. Besides the routine work for the survey, several miscellaneous photographs have been taken. Weather has in general been unfavorable for photography during the past year. —*British Journal of Photography.*

Russian Photographic Society.—It is intended to hold in Moscow during the months of February and March, 1896, under the auspices of the above-named Society, a photographic exhibition on a large scale. The exhibition will be presided over by the Grand Duke Sergius, Governor-General of Moscow. The time appointed for the opening of the exhibition has been purposely fixed at so distant a date partly with a view to enable photographers from all parts of the world to participate without inconvenience, and chiefly on account of the exceptional interest that Russia and the city of Moscow in particular will then enjoy in the eyes of the world in connection with the great event of the Coronation of the Emperor, which is to take place in the spring of next year. All enquiries as to space and particulars are to be addressed to the President of the Russian Photographic Society, Mr. Vladimir Karlowitch Wulfert, Serebrianny pereulok No. 9, Moscow, Russia.

Mr. Phil May, the young English illustrator, is undoubtedly clever as a draughtsman, and his pictures are all that one could desire, but he should stop seeking to emulate Du Maurier in trying to write his own jokes. Recently he was picked up on one of his humorous sketches in *Punch,* the points of which, it is said, had appeared in practically the same shape 23 years before. From the current number of London *Sketch* this dialogue is under a cleverly-drawn picture of two urchins:

"Give us a bite of yer apple, Billy?"

"Shan't."

"Well, leave us a bit of the core?"

"There ain't goin' to be no core."

Whether this joke is newer in England than the before referred to *Punch* one or not, it is difficult for us to state, but there is no more ancient or better known one in the memory of man in this country. It is amusing to see this saying, which was probably familiar to our

oldest inhabitant's great-grandfather, masquerading in a high-class English journal under the drawing of one of England's acknowledgedly most promising black-and-white artists as a brand new and original witticism especially evolved and constructed for the occasion.

Formalin, or formic aldehide, which is recommended as a convenient and effectual means of rendering gelatine insoluble, bids fair to have a much more extended sphere of usefulness. As an antiseptic, according to a recent number of the *Chemical News*, it is more powerful than a mixture of equivalent parts of boric acid and borax, and prevents decomposition, even in such unstable (and uncertain) compositions as the morning's milk. The addition of only eight and three-quarter grains of a forty per cent. commercial sample of formalin to a gallon of milk is said to have preserved it sweet for a period of six weeks, and a sample, on analysis, gave precisely the same results at the end of that period as at the beginning. Judging from this, it would be a most useful addition to the starch, or whatever other substance is employed as a mountant for photographs in the studio. But in the more purely chemical point of view, formalin will probably become of importance to the photographer. The *Bulletin Chemical Soc., Paris,* has a communication from Messrs. Brichet and Chambier, who have utilised the interaction which takes place between formalin and ammonium chloride in the formation of methylamine hydrochloride. The method is said to give good results and almost a theoretical yield. Two kilogrammes of formalin of forty per cent. and one of ammonium chloride are placed in a flask of three litres' capacity. A vigorous action ensues, and, when it is complete, the mixture is subjected to distillation, when a large quantity of methylal —$HCH(CHO_3)$—which is produced by the condensation of the formaldehyde with methyl alcohol used as the solvent, passes over. The residue is further concentrated by evaporation until the ammonium chloride in excess just begins to separate, when it is allowed to cool and then passed through the filter. The filtrate is almost pure methylamine hydrochloride. The two kilos of formalin used yielded 850 grammes, or about ninety-five per cent. of the theoretical quantity.

Francia did not begin to paint until nearly sixty years of age, and in ten years executed a long series of beautiful paintings.

At the fifty-second exhibition of the Boston Art Club, the first prize was awarded to Walter L. Palmer, for his "La Salute by Moonlight."

Photographic Hints and Formulæ.

To Strip Film from Ordinary Plates.—Give negative two coats of a 2 per cent. collodion. The following formula yields good results:

Negative cotton	30 gr. (2 grm.)
Ether	1 oz. 6 drm. (50 c.c.)
Alcohol	1 oz. 6 drm. (50 c.c.)

Allow the first coat to dry before applying the second, and when second coating has set, place immediately in cold water until greasiness has disappeared, then place in a bath of

Sodium fluoride (com)	5 drm. (20 grm)
Water	5 oz. (160 c.c.)

When thoroughly saturated with this solution, which will take at least an hour, place without washing in

Water	7 oz. (196 c.c.)
Sulphuric acid	1 drm. (4 c.c.)

Rubber trays should be used for this and the fluoride bath. When film begins to loosen, lay a piece of writing paper or celluloid upon it as a support, and separate the two from the glass. After washing well under tap it can be transferred to a permanent support.

The following will answer the purpose: Coat a clean glass plate which has been rubbed with French chalk, and dusted with

Gelatine	2½ oz. (75 grm.)
Water	16 oz. (500 c.c.)
Glycerine	3 drm. (10 c.c.)

Filter before coating through canton flannel, and avoid air bubbles. Coat on a leveling stand as thick as the plate will hold, allow to set and dry.

Platino Solio Prints.—The Eastman Company have issued the following directions for making platino solio prints: Wash in 5 or 6 changes of water to remove the free silver.

Tone in a plain gold bath, using about 1 gr. of gold to 48 oz. of water. Neutralize by adding a saturated solution of borax, bicarbonate of soda or sal soda.

The bath should tone in 6 or 7 minutes.

Tone by transmitted light for the high lights and half tones only, paying no attention whatever to the shadows.

If a warm tone is desired remove prints from toning bath as soon as high lights are cleared.

We recommend a neutral bath, and advise the use of Squibb's red litmus to test with.

If the bath tones uneven or streaky, add water until it tones in 8 or 10 minutes, and make it slightly alkaline.

When toned immerse prints in running water where they remain until all are ready for the fixing.

If running water cannot be had put prints into

Salt	1 oz.
Water	1 gal.

If there is a large batch of prints to be toned do not allow prints to lie in short stop solution, but put them into a tray containing clear water where they may remain until all are ready for the fixing.

Hyposulphite of soda	12 oz.
Water	1 gal.
Solio hardener	¼ oz.

The regular solio fixing bath may be used in place of above fixing if desired.

Fix 20 minutes, keeping prints in constant motion the entire time they are in the solution. Allow 1 gallon of fixing solution for each gross cabinet prints or their equivalent.

Wash 1 hour in running cold water or in 16 changes of cold water, keeping prints separated so that the water may have a chance to eliminate the chemicals.

Prints allowed to stand over night in water are liable to turn yellow. They should be mounted as soon as washed.

After burnishing grind the face of print with fine ground pumice stone, rubbing with the hand all over the surface until the gloss is removed. Brush off the print with a camel hair brush or a tuft of absorbent cotton. It takes about a minute to do the work on a cabinet print, and the results obtained are richer and more brilliant than can be produced on matt surface paper.

It is reported from Paris that the hard times and low prices in art productions, which have been prevailing for so long, have at last passed away and at present there is an abundance of money and great demand. A good evidence of the improved condition was shown in the recent Beurkeley sales. There were two sales, and the total amount realized amounted to $300,000. A third sale will follow.

In the Twilight Hour.

GOD is the sun, we are the mirrors.

IF the pill is bitter, don't stop to chew it.

A GOOD opportunity is seldom met in a beaten track.

THERE is no service like his that serves because he loves.—*Sir Philip Sidney.*

IF angels had to live with some men, there would probably be more fallen ones. —*Ram's Horn.*

THE oath that falls from the profane man's lips becomes a dagger in somebody's breast —*Ram's Horn.*

THE best way for a man to get out of a lowly position, is to be conspicuously effective in it.—*Dr. John Hall.*

TRUTHS are the roots of duties, deeds are the fruit. A rootless duty, one with no truth below it, out of which it grows, is fruitless, dead.

IT is not enough in home life that we love one another. Let us show that we do by tender words, caresses, and acts of gentle self-denial.

RELIGION is the basis upon which all civil government rests—from which power derives its authority, laws their efficacy and both their sanction.—*Webster.*

"SO teach us to number our days that we may apply our hearts unto wisdom." St. Augustine says we will never do that until we number our day as our last day.

DANIEL WEBSTER was once asked what was the greatest thought that ever occupied his mind. His face became serious as he replied, "The greatest thought I ever had was the sense of my responsibility to God."

BETTER be rich in good than in goods.

DON'T talk cream when you are living skimmed milk.

LONG prayers will not make up for a short yardstick.

IT is not necessary to get away from humanity to get near to God.

NO matter what he claims to be, the man who does nothing is nothing.

SICKNESS is often a reflection on a man's good sense, or moral character, or both.

THE richest man is the one who can give away the most without regretting it.—*Ram's Horn.*

DON'T reach out to a drowning man the icy end of a stick, or to a perishing sinner the tip joint of a kid glove.

IF the power to do hard work is not talent, it is the best possible subititute for it. Things don't turn up in this world until somebody turns them up.—*James A. Garfield.*

EXCELLENT ADVICE. — An amusing story is told of King James I., of England. When a boy he had the curious habit of r ding with his mouth open. Once, when riding through a muddy field, the mire splashed into his mouth. In his distress he turned to his attendant and stammered, "What shall I do, the mud is getting into my mouth?" The attendant replied with great respect, "Please, your Majesty, keep your mouth shut." This bit of sound advice is excellent, not only for keeping mud from entering the mouth, but for preventing filth and wickedness from coming out of the mouth. Cultivate the art of keeping your mouth shut.

BARGAIN LIST.—AUGUST, 1895.

PORTRAIT CAMERAS.

[For Lenses see Special List.]

1—11x14 Portrait Camera, with 8x10 attachment, . . . $60 00
2—8x10 D. S. B. Portrait Cameras, each 15 00
1—8x10 D. S. B. Portrait Camera, with Benster Holder, . . . 25 00
1—14x17 D. S. B. Portrait Camera, 40 00
1—5x7 Victoria Camera, 4 ¼ lenses, ... 18 00
1—5x7 Victoria Camera, ... 8 00
1—5x7 Victoria Camera, ... 9 00
1—5x8 Stamp Camera 15 00
1—5x8 Wet Plate Stereo. Camera, 3 holders, ... 20 00

VIEW CAMERAS.

1—6½x8½ View Camera, 1 holder, lense and tripod, ... 12 50
1—5x7 New Model Outfit new . . 9 00
1—6½x8½ View and 2 holders . 8 00
1—6½x8½ S. S. View Camera, Shutter and Eagle Lenses, . 35 00
1—4x5 NewModel Improved Camera, ... 11 90
1—8x10 View Camera and Holder, new, ... 16 00
1—5x8 New Model Camera, . . 10 00
1—8x10 Eastman Reversible Back Camera 25 00
1—6½x8½ Novelette Camera, new, ... 20 00
1—5x8 Blair Single Swing View Camera 15 00
1—6½ x 8½ American Optical Co.'s View Camera, ... 20 00
1—5x7 Blair Rev. Back Camera, new 25 00
1—5x8 Boston Rev. Back Camera, new 25 00
1—¼ Eclipse Outfit, ... 2 00
1—5x8 '76 Camera, Holder, Tripod, and Case, ... 23 00
1—5x7 View Camera, ... 7 00
1—5x8 Blair Rev. Back Camera, and 4 holders, ... 25 00
1—14x17 Ideal Camera, holder, tripod, Orthoscope lens and case, ... 100 00
Without lens, ... 40 00

HAND CAMERAS.

1—4x5 Tuxedo Folding, 4 holders 12 00
1—No. 1 Kodak, ... 10 00
1—A Ordinary Kodak, new, . . 5 00
1—5x7 Folding Kodak, new, . 55 00
1—C Daylight Kodak 15 00
1—4x5 Climax Detective, new, . $18 00
1—4x5 Turnover Detective, new, 15 00
1—4x5 Montauk Detective, new, 18 00
1—4x5 Hawkeye, Darlot lens, 3 holders, list $33, ... 18 00

ACCESSORIES.

1—Magic Camera Stand 6 00
1—Seavey Balustrade 5 00
1—Seavey Vase 2 00
6—5x7 Printing Frames, each, . 25
10—6½ x 8½ Printing Frames each, ... 35
1—10-in. Burnisher, double roll . 8 00
1—14 in. Drag Burnisher, . . . 5 00
3¼x4¼ Washing Boxes, each, 50
5x7 and 5x8 Washing Boxes, 1 00
1—8 ft. Show Case 12 00
—Large Oak Show Frames, each 5 00
1—8x10 Knickerbocker Stand, . 5 00
1—Corner Chair, Velvet, list $20, 10 00
1—Cooper Enlarging Bromide Lantern, 8 in condenser . . 35 00
1—11-in. Acme Burnisher. . . . 12 00
1—14-in. Eureka Burnisher, . . 18 00
1—15-in. Improved Eureka Burnisher 25 00
1—15-in. Acme Burnisher, . . . 20 00
1—Acme Print Trimmer, new, . 10 80
1—Baldwin Print Cutter, new, . 14 00
Lot of Picture Mats. Write for particulars.
1—14x17 Printing Frame, . . . 1 25
1—18x22 Printing Frame, . . . 2 50
1—11x14 Printing Frame, . . . 1 00
1—8x10 Printing Frame, ... 40
1—10x12 Adaptable Washing Box 3 00
1—14x17 Adaptable Washing Box 4 50
1—19x24 Deep Agate Tray, . . 5 00
2—6x8 Children's Backgrounds, 3 00 and 4 00
2—8x10 Bryant Backgrounds, 6 00 and 7 00
1—Wall Accessory, ... 4 00
1—Daisy Foreground, ... 4 00
1—Seavey Swiss Cottage 8 00
1—Osborne's Rock Accessory, . 10 00
1—Osborne's Pillar Accessory . . 15 00
Lot of second-hand backgrounds, 8x10 and 6x8, $3.00 to $6.00; write for particulars.
Peerless Varnish Pots, each . . . 40
Full line of Packard Brothers' Grounds *in stock*. Interiors $5.00; exteriors, $4.00.
3—Junior Ruby Lamps, each, . . 60
1—4¼x5½ Negative Box 35
1—Walmsley Reversible Finder . 2 50
1—Card-size Burnisher 3 00

NOTICE.

To the Photographic Fraternity:—

As there has been a feeling at the various Photographers' Conventions that the manufacturers of photo supplies have been securing too much attention, and that the exhibits made and the prizes given by them on such occasions rather diverted the interest of the members from the displays and prizes of the Association, we, the undersigned manufacturers of dry plates, hereby agree to make no displays, nor offer prizes of any kind at future Photographic Conventions.

We feel it our duty to take this course, and trust by doing so to have the good will and wishes of the entire fraternity. We will continue to aid and support the Conventions, and will be ably represented, and pleased to meet our many friends on all these occasions.

Yours very truly,

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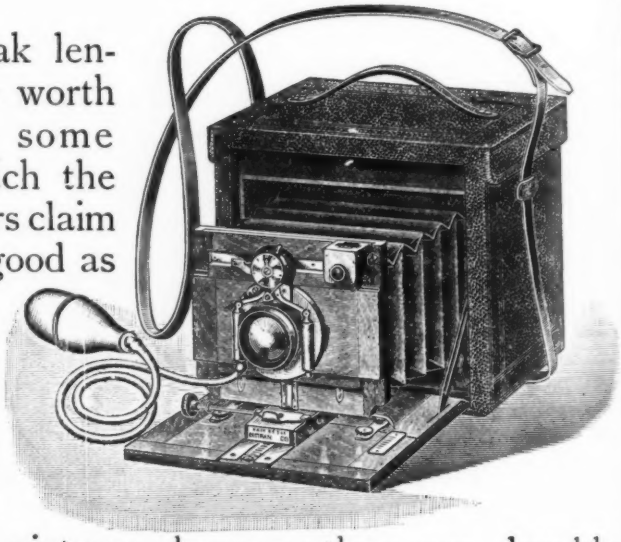

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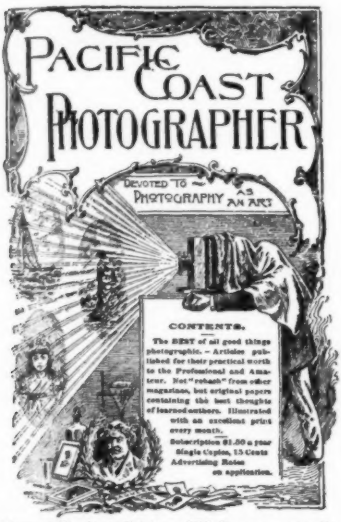

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5,	$2\frac{1}{8}$ "	12½ "	8 x 10	30.00
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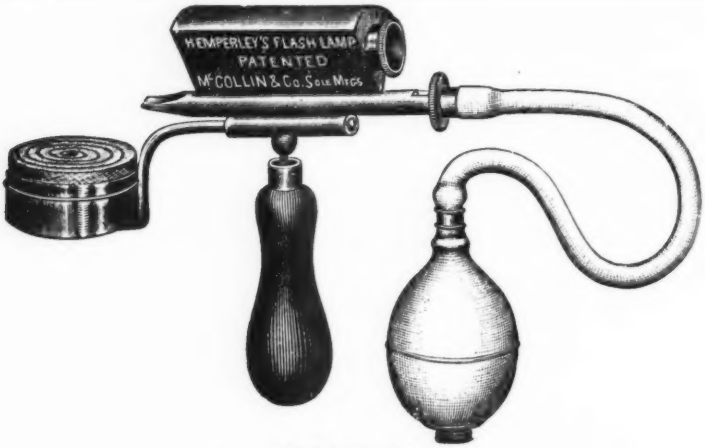

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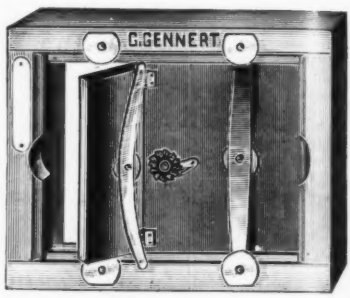

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